

The Architecture of the Bank of 2030

A white paper by Oliver Cronk and Joel Smith



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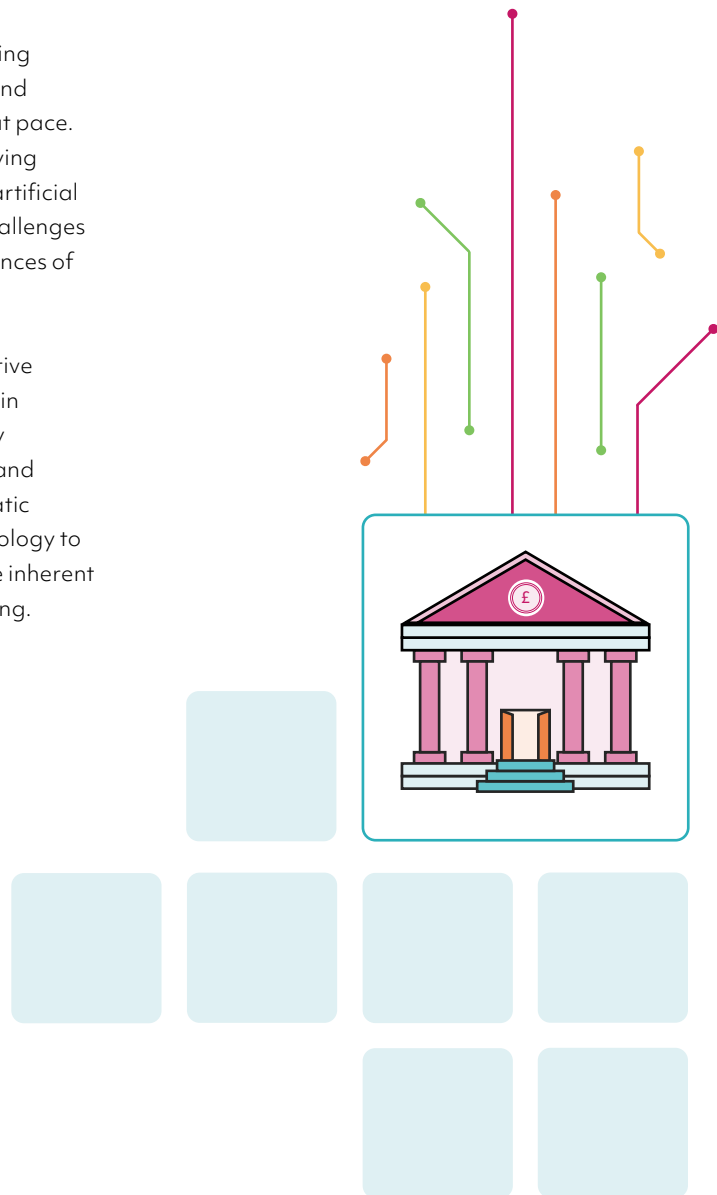
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Introduction

As highlighted in our recent publication *How to become the bank of 2030*, the retail banking landscape is undergoing a tectonic shift.¹ Open Banking is evolving into Open Finance, embedded finance is blurring industry lines, and customers are demanding hyper-personalised experiences.²

Technology companies are increasingly becoming competitors, offering slick digital experiences and bringing new products and services to market at pace. At the same time, regulatory scrutiny is intensifying around data privacy, security and responsible artificial intelligence (AI). Banks also face the internal challenges of legacy systems, data silos, and the consequences of past underfunding of technology.

As a technology leader, you will know that to thrive in this new era, banks must balance investment in the foundations whilst evolving their technology architecture to be more open, agile, intelligent and resilient. In this white paper, we provide pragmatic insights on how to modernise your bank's technology to capitalise on the opportunities and mitigate the inherent risks, while managing the challenges of operating.



¹ <https://go.scottlogic.com/bank-of-2030>

² <https://www.investopedia.com/what-is-embedded-finance-8417153>

Two layers of the bank of 2030

Banks can keep pace with customers' demand for frictionless and reliable modern banking experiences. It involves targeting investment to strike the right balance between apparently conflicting concerns.

Failing to strike this balance risks losing customers due to either:

- Playing it too safe – whilst you might be seen as reliable, you won't wow them
- Engaging them with new experiences only to let them down with inconsistency, security breaches, and outages

On your transformation journey, you'll find yourself balancing two parallel concerns or layers:

1. Business as Usual (BAU)

BAU focuses on incremental modernisation of legacy systems to keep the lights on and maintain regulatory compliance. This involves tasks like maintaining legacy code, upgrading infrastructure, and implementing tactical fixes to meet immediate business needs. Banks often struggle with the complexity of managing and modernising these legacy systems, which can consume a significant portion of their IT budgets and hinder agility. Additionally, off-the-shelf Software as a Service (SaaS) solutions may not fully meet the unique requirements of various business lines. While essential, the BAU path alone is not sufficient to stay competitive in the long run.

2. New Capabilities

Work on New Capabilities focuses on delivering new products, services, content and features to stay relevant in a fast-paced market. This includes personalisation, digital identity, Central Bank Digital Currency (CBDC) integration, technology vendor wallet services, and digital native FinTech offerings. Banks need to ensure that not only are their products and services more compelling than other offerings, but that they are underpinned by an enterprise-grade and regulation-compliant back-end.

This is the age-old tale of finite resources, board-level risk aversion, and a long list of things to do as you navigate both paths. Meanwhile, many of your competitors can dash ahead, unencumbered by the BAU, and deliver customer-tempting New Capabilities.

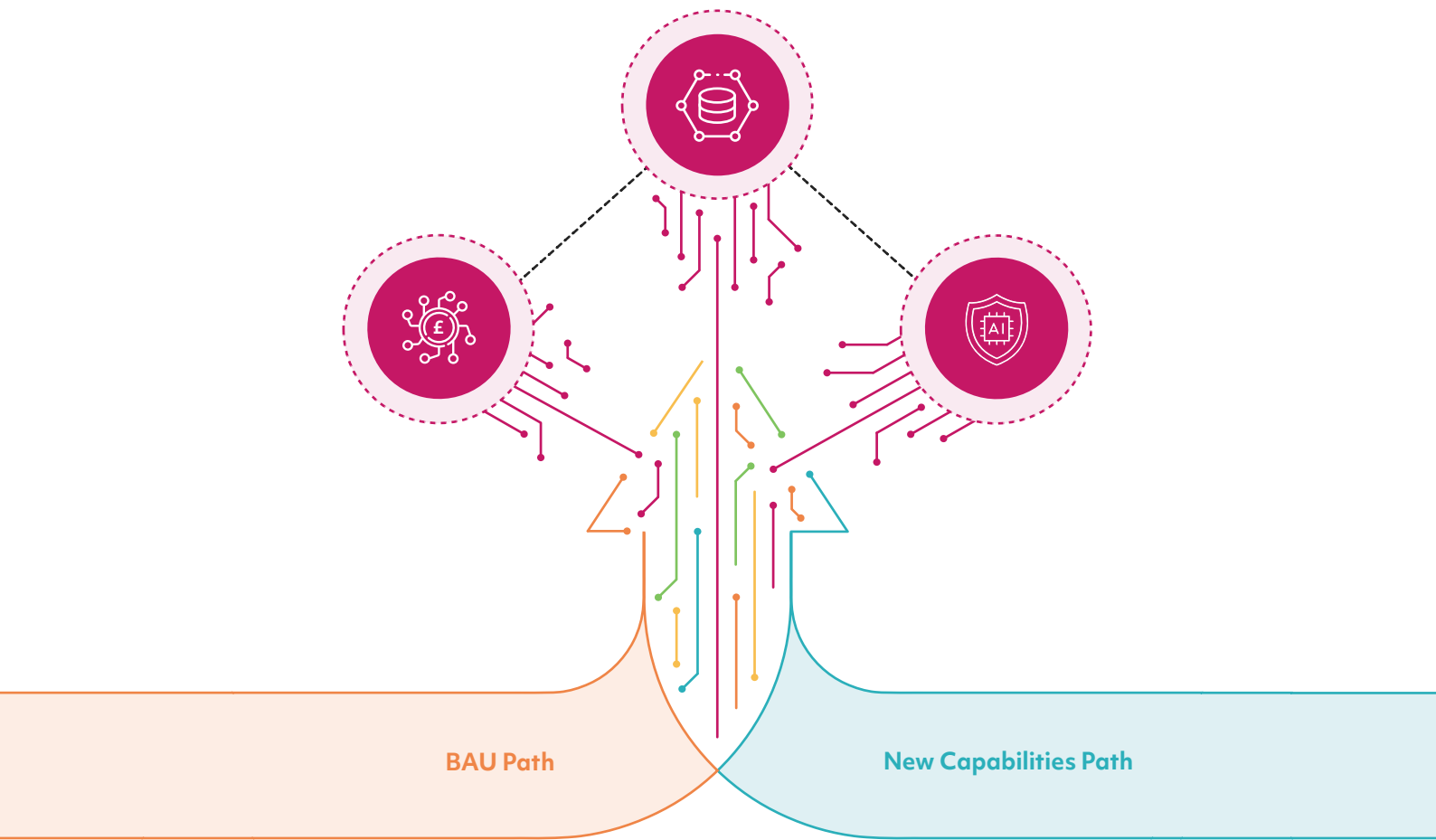
If you throw effort and money solely at the New Capabilities path, it will create fragile experiences (much like trying to build a house on top of crumbling foundations). Additionally, it won't deliver the sustainable agility that you need to stay competitive – in fact, it could make further improvements harder as complexity increases.

Is it possible to keep up?

The key is to recognise that BAU and New Capabilities are complementary and symbiotic with each other.

The BAU path should lay the foundation for the New Capabilities path by modernising prioritised parts of core systems, cleaning up data, and exposing interfaces for new capabilities such as APIs and event-driven architecture. Conversely, the New Capabilities path, through AI, can accelerate the BAU path by automating manual processes, assisting with legacy code bases, augmenting human decision-making, and identifying opportunities for optimisation.

Through this symbiosis, the work of delighting customers with frictionless experiences becomes a shared endeavour. Targeted effort by BAU teams to refactor code and make changes to architecture and design are just as important to the outcome as the New Capabilities work that they underpin.



The latest disruptors

The challenge of balancing BAU with New Capabilities in the banking sector is exacerbated by the pace and scale of disruption. Here are some of the latest disruptors.

Crypto entering the mainstream?

While they have been highly divisive, cryptocurrencies look like they are here to stay. So much so that central banks are now making moves towards adopting them as part of the more established financial system.

Smart Data

Smart Data promises to open up individual and business transactional data and provide greater ownership and control to individuals and organisations.³ Consumers will expect their banking services to work with this data to give them far more granular insight into where they are spending money and the details of their flows of capital.

Artificial Intelligence

There is a lot of hype around Generative AI. However, there is little doubt in its ability to hyper-personalise customer experiences. More traditional automation and machine learning (ML) promise to help manage risk, automate complex processes and uncover new insights from data. Keeping up requires significant investments in data platforms, AI/ML capabilities, and talent. Less regulated organisations can get away with high-risk experimentation, but a retail banking failure in this space is unlikely to be tolerated – the reputational damage and regulatory response would likely be severe.

³ <https://www.gov.uk/government/collections/creating-a-smart-data-economy>

Pressures on Retail Banking Architectures

Constant pressure is placed on retail bank architectures – and the teams that maintain them – by a range of drivers.

Opening up

The global transition from Open Banking to Open Finance (and in the near future, Smart Data) is perhaps the most significant driver of architectural change currently in play. Banks need to expose APIs for a wider range of products and services and consume APIs from an ecosystem of partners. While this can be achieved through facades like API gateways, forward-thinking banks are increasingly using this shift as an opportunity to modernise their architectures to increase agility and improve risk management. For some parts of the architecture, this means a shift from monolithic, hard-to-change architectures to microservices that can more readily be composed into new customer propositions.

Rising customer expectations

Rising customer expectations for mobile and digital experiences, which many banks are struggling to meet with their current systems, require a more agile and customer-centric approach to software development.

The rise of embedded finance means banks must design their services to be seamlessly integrated into third-party customer journeys. This calls for a headless architecture where the bank's capabilities can be consumed through APIs without dictating the front-end experience. The customer experience of your brand is no longer confined to your bank's technology estate; it is now also shaped by the number and quality of the integrations with others that you support.

Personalisation at scale is another key imperative, relying on the ability to harness vast troves of

customer data and apply AI/ML in real-time. A modern data platform is a must – one that can ingest, store and process data from multiple sources, and serve it up to fuel AI-powered decisioning.

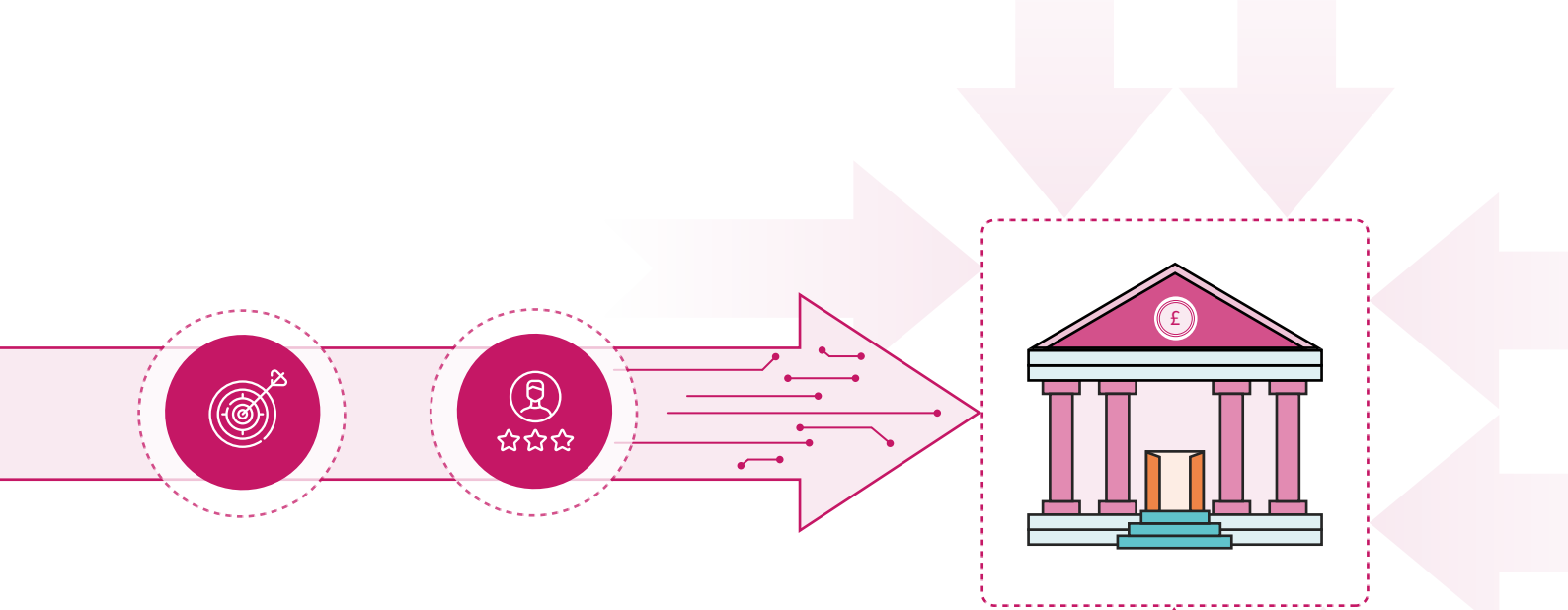
Regulatory frameworks

Underpinning all of this is an ever-expanding set of regulations – from longstanding ones around data privacy, security, and fairness to new regulations around the explainability of AI systems. Sustainability of technology is also coming under the spotlight and is the subject of new EU regulations. Compliance, which is often manual and time-consuming, requires a more automated and integrated approach. It needs to be woven into a bank's technology fabric, particularly when it comes to AI and data platforms, enabling innovation within smart guardrails.

Organisational challenges

Technology teams are often held back by outdated organisational cultures and processes which constrain their ability to keep pace with external drivers of change. Traditional approaches to project governance significantly limit teams' ability to work in agile, collaborative ways and deliver competitive advantage in a fast-moving market.

Adherence to outmoded business processes also holds back technology teams in supporting a bank's business strategy. For example, successfully harnessing the cloud requires far-reaching business process changes such as the adoption of a cloud operating model and a cloud strategy. These form part of the wider technology strategy (including a data strategy), all of which are in support of enabling the business strategy.

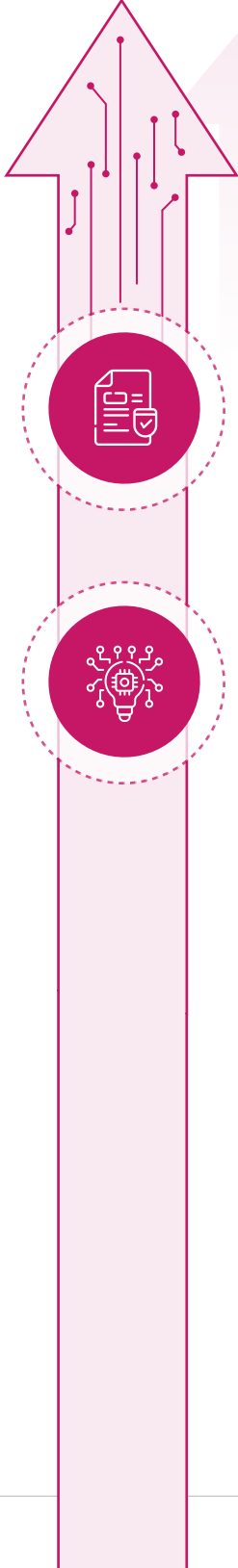


As a result, technology teams cannot shape fit-for-purpose banking architectures in isolation. They face pressure to bring new products and services to market quickly. However, this requires a more modular and composable approach to product development and software architecture, leveraging reusable components and APIs. Introducing changes such as these has implications beyond the IT organisation, requiring wider business changes.

Technology challenges

Legacy technologies and outmoded paradigms seriously hamper the ability of banks to scale systems to meet growth ambitions. Systems designed to process data using the batch processing paradigm cannot simply be switched overnight to data streaming in support of near-real-time interactions. As a result, banks with legacy estates can't access the real-time insights which underpin the data-driven decision-making of their nimbler challenger bank competitors.

What's needed is a move to more modular and elastic architectures, often leveraging cloud technologies. This can be achieved in an incremental and iterative manner, allowing banks to secure early business value during the transition. Some of the modularisation work can be done on-premises first as part of a refactoring exercise to make apps cloud-ready before migration. Within these new modular architectures, a modern data platform can integrate data from multiple sources and provide self-service analytics in near-real-time.



Designing an Architecture for the Bank of 2030

Faced with the pressures on retail bank architectures, banks must modernise – but the task can appear overwhelming and prohibitively expensive. It needn't be. Here and in the chapter that follows, we propose a reference architecture that will support both the BAU and New Capabilities layers, along with a pragmatic roadmap of steps to set it up.

Architectural considerations

Modernising legacy systems is perhaps the biggest hurdle for most banks. The complexity of the existing application landscape, coupled with the need to maintain business continuity, can make this a daunting task. A pragmatic approach is to decouple monolithic systems into microservices gradually using techniques like the Strangler Fig pattern.⁴

As banks open up their services to external parties, they need to design for interoperability and flexibility. This means adopting industry standards for APIs (e.g., OpenAPI), data models (e.g., ISO 20022), and authentication/authorisation protocols (e.g., OAuth 2.0). A layered architecture with clear separation of concerns can help manage the complexity.

Scaling AI/ML across the enterprise requires a robust underlying data platform and Machine Learning Operations (MLOps) pipeline to automate the end-to-end lifecycle of ML models from training to deployment. Techniques like transfer learning and federated learning can help overcome the scarcity of labelled data in some domains.

Security and privacy need to be first-class citizens in the architecture – built in, rather than a bolt-on. Techniques like zero-trust security, secure multi-party computation and homomorphic encryption are gaining traction to enable data sharing without compromising privacy.

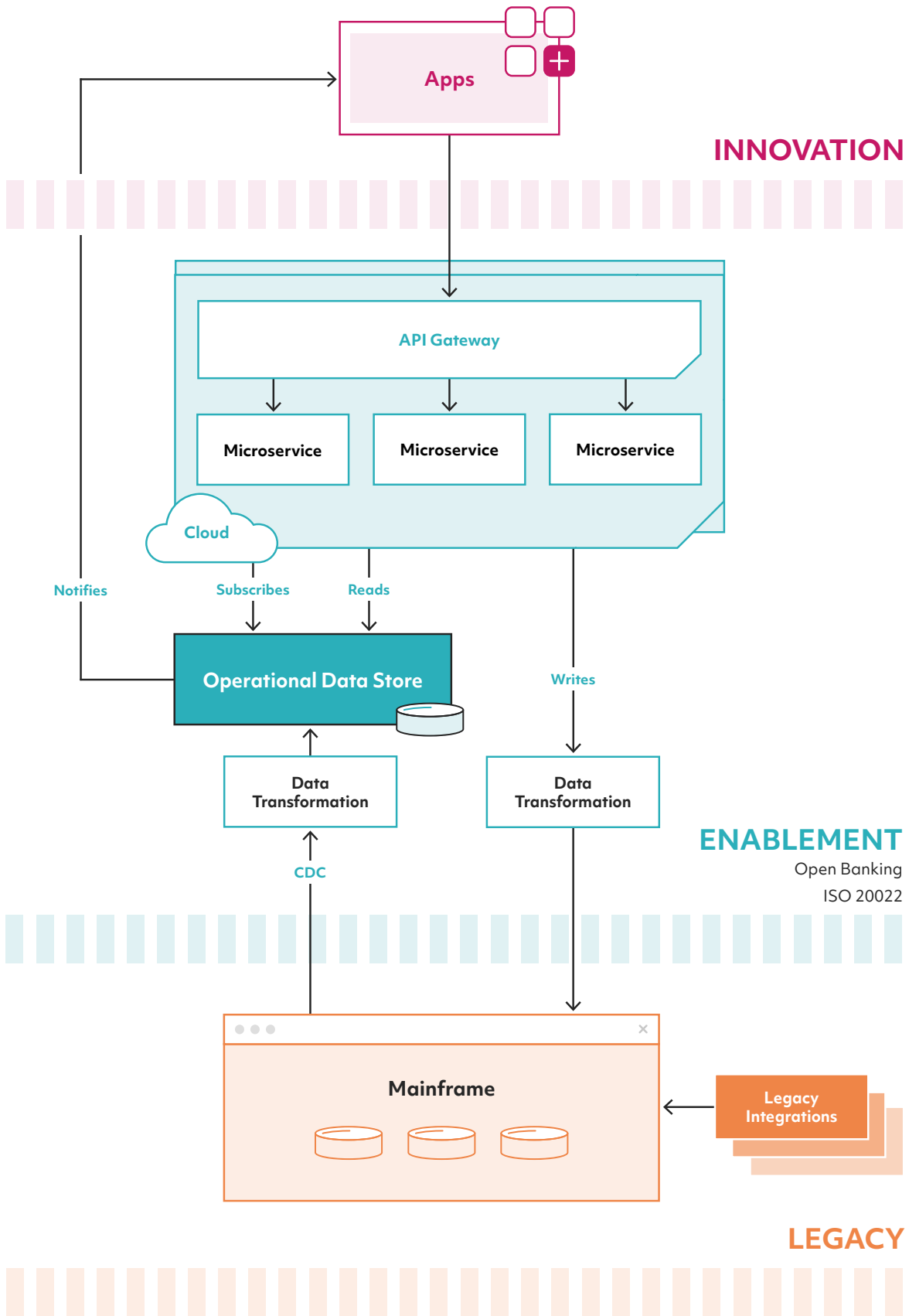
Cost and sustainability are also key considerations. Moving to the cloud can help manage operating costs, but care must be taken to weigh up the pros and cons of working with a single vendor and to avoid cost sprawl. A vendor exit plan is essential if you take the single vendor route, and the emerging practice of FinOps is designed to support financial accountability and maximise business value.⁵

Embracing serverless computing, auto-scaling and Platform as a Service can help optimise resource utilisation.⁶ Upskilling the existing workforce is crucial to build and operate this new architecture sustainably – the certifications available from vendors can offer a strong incentive.

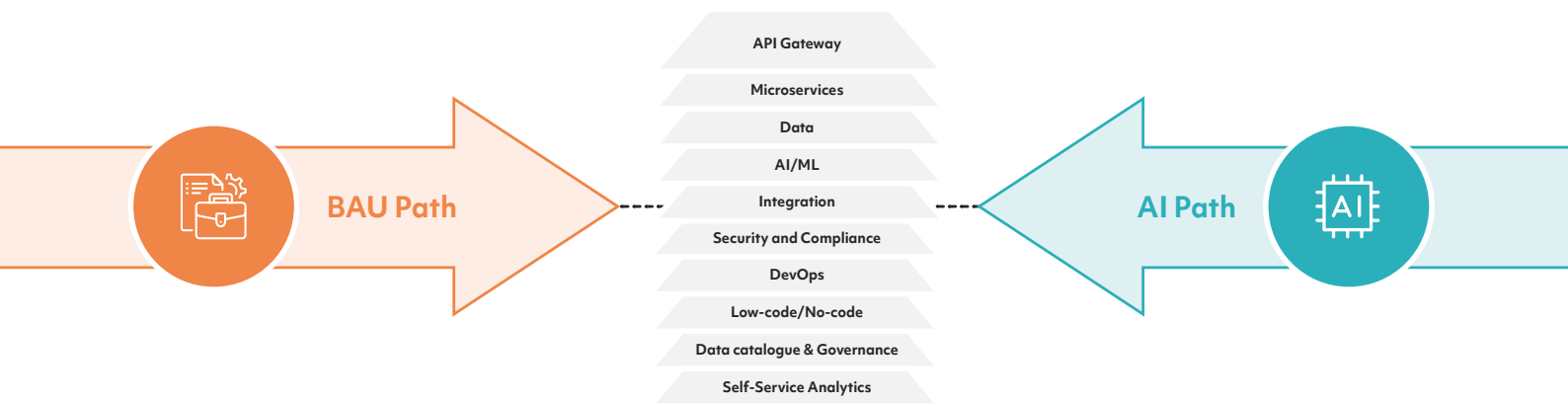
⁴ <https://martinfowler.com/bliki/StranglerFigApplication.html>

⁵ <https://www.finops.org/introduction/what-is-finops/>

⁶ https://en.wikipedia.org/wiki/Platform_as_a_service



The diagram shows only transactional and operational systems. It excludes analytical platforms for simplicity, but they could also be integrated into this architecture.



The reference architecture needs to support both the BAU and AI paths, with clear integration points between them. Some key considerations:

- The API Gateway should support both internal and external APIs, with granular access controls and usage tracking.
- The Microservices layer should be designed for loose coupling and independent deployability, with clear boundaries between domains.
- The Data Platform should support near-real-time, event-driven approaches alongside support for batch processing, semantic and linked data, with strong data governance and quality controls.
- The AI/ML Platform should support the end-to-end lifecycle of models, from experimentation to deployment to monitoring.
- The Integration Layer should support various integration patterns (e.g. APIs, events, messages) and be able to scale independently.
- The Security and Compliance layer should provide centralised authentication, authorisation, and auditing across all components. This is the layer that will need significant focus – it’s the layer that allows for risk-managed product, service and operating model innovations.

In addition to the capabilities mentioned earlier, the architecture should also prioritise:

- Consolidated DevOps platforms to enable agile development, continuous integration/ deployment, zero/low downtime deployment and automated testing.
- Smart deployment of a low-code/no-code platform to enable business users to rapidly build and deploy applications.
- A data catalogue and governance platform to enable discovery, quality control, and secure access to data assets, with a focus on semantic and knowledge graph capabilities to link data sets with next-gen AI capabilities.
- A self-service analytics platform to enable business users to explore data and gain insights independently.

Pragmatic Roadmap and Next Steps

Depending on what stage you've reached in your modernisation efforts, the phases below will give food for thought on what to put in your future roadmap.



Phase 1: Foundation and Data Product Platform

(The first 6–12 months)

1. Conduct an assessment of current core banking systems and their interdependencies.
2. Design and implement a Data Product Platform:
 - Set up Change Data Capture (CDC) from legacy systems
 - Develop data transformation processes
 - Create an initial set of data products with logical data models
3. Implement an event-streaming platform (e.g., Kafka) for publishing change events.
4. Develop an API strategy, focusing on 'read' operations via the Data Product Platform.



Phase 3: Digital Channel Enhancement and Legacy System Offloading

(18–36 months from the start)

1. Enhance digital channels (mobile, online banking) to utilise new APIs and event streams.
2. Gradually replace file-based integrations with event-streaming mechanisms.
3. Optimise mainframe usage by offloading read operations to the Data Product Platform.
4. Implement caching and Command Query and Responsibility Segmentation (CQRS) patterns for improved performance and scalability.⁷



Phase 2: Cloud Microservices and API Layer

(12–24 months from the start)

1. Develop cloud microservices to interact with the Data Product Platform.
2. Implement an API Gateway to manage and secure API access.
3. Create REST APIs for key banking functions, leveraging the logical data model.
4. Begin redirecting 'read' operations from legacy systems to the new APIs.



Phase 4: Advanced Capabilities and Continuous Modernisation

(Ongoing)

1. Implement advanced analytics and AI/ML capabilities using the Data Product Platform.
2. Explore new business models enabled by the modernised architecture (e.g., Banking as a Service).
3. Continuously refine and expand data products and APIs based on business needs.
4. Gradually replace or modernise remaining legacy core banking functions.

⁷ <https://learn.microsoft.com/en-us/azure/architecture/patterns/cqrs>

Underpinning the roadmap

In support of the roadmap, there is a range of additional activities you should consider to give the modernisation the best chance of success at your organisation.

Technology



- Maintain backward compatibility with legacy systems throughout the modernisation process.
- Focus on reducing mainframe Millions of Instructions Per Second (MIPS) usage to lower operational costs.⁸
- Partner with the FinTech ecosystem to accelerate innovation and fill capability gaps. Many smaller FinTechs aren't encumbered by the scale and materiality that makes them subject to close regulatory scrutiny – as a result, they can develop their banking platforms from a clean slate. Once these have proven themselves in the market, they pose interesting tech platform acquisition and/or acqui-hire options.

Skills and Ways of Working



- Invest in training and hiring for cloud, microservices, and data engineering skills.
- Adopt agile and DevOps methodologies across the organisation to improve collaboration and time-to-market.
- Establish a Centre of Excellence (CoE) for AI/ML and API development to build internal skills and drive best practices.
- Invest in data literacy programmes to upskill business users and promote a data-driven culture so that they can fully leverage the latest wave of data-driven innovation.

Governance



- Ensure strong data governance and security measures across all new platforms.
- Develop a clear governance framework for AI/ML to ensure responsible and ethical use of these technologies.

Stakeholder communications



- Regularly measure and communicate the benefits of modernisation (e.g., increased scalability, reliability and fault tolerance, and reduced time-to-market).

⁸ <https://www.techtarget.com/searchitoperations/definition/MIPS-million-instructions-per-second>

Conclusion

The Bank of 2030 will be a dynamic, adaptive organisation that seamlessly blends traditional banking stability with cutting-edge technological innovation. By successfully navigating the dual paths of Business as Usual and New Capabilities, banks can create a synergy that drives unprecedented value for customers and shareholders alike.

Key takeaways

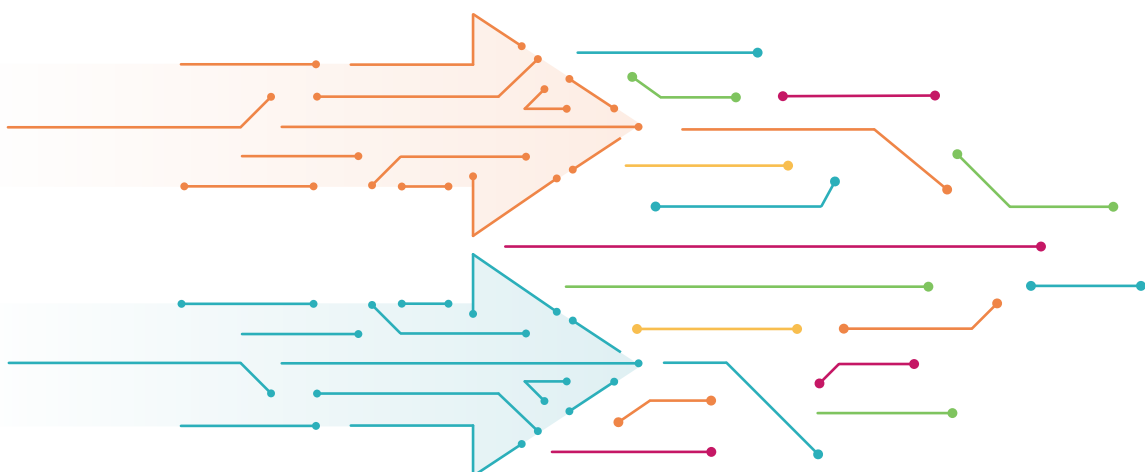
Key takeaways for banks embarking on this transformation journey:

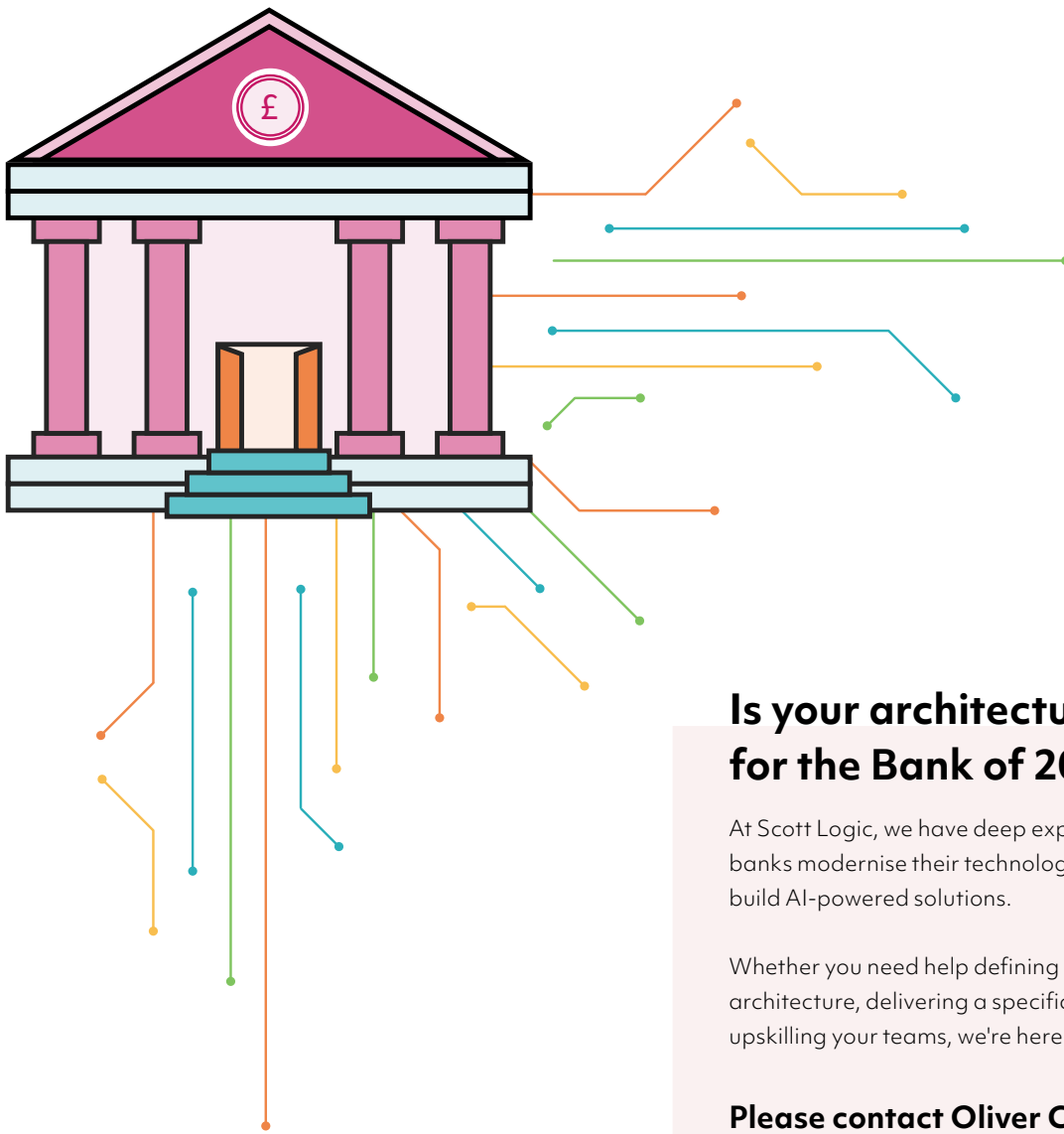
- Embrace a modular, API-first architecture that enables rapid innovation and seamless integration with partners.
- Invest in cloud technologies to enhance scalability and reliability and accelerate time-to-market for new services.
- Prioritise data quality and governance as the foundations for AI/ML initiatives and personalised customer experiences.
- Foster a culture of continuous learning and innovation to attract and retain top talent.
- Maintain a strong focus on security, privacy, and regulatory compliance throughout the transformation process.

The path to becoming the Bank of 2030 is challenging but achievable. It requires a clear vision, strategic investments, and a willingness to embrace change at all levels of the organisation. Banks that successfully make this transition will not only survive in the digital age but will thrive, setting new standards for customer service, operational efficiency, and innovation in the financial sector.

As you embark on this journey, remember that you don't have to go it alone. Partnering with experienced technology consultants can help accelerate your transformation, mitigate risks, and ensure you're leveraging best practices every step of the way.

The future of banking is here. Is your architecture ready for you to become the Bank of 2030?





Is your architecture ready for the Bank of 2030?

At Scott Logic, we have deep expertise in helping banks modernise their technology architectures and build AI-powered solutions.

Whether you need help defining your target architecture, delivering a specific use case, or upskilling your teams, we're here to help.

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